

1016-37-309

Angela E Grant*, Department of Mathematics, Northwestern University, 2033 Sheridan Rd, Evanston, IL 60208-2730, and **Brian R Hunt**, Institute for Physical Science and Technology, University of Maryland, College Park, MD 20742. *Finding Optimal Orbits of Chaotic Systems*. Preliminary report.

Chaotic dynamical systems can exhibit a wide variety of motions, including periodic orbits of arbitrarily large period. We consider the question of which motion is optimal, in the sense that it maximizes the average over time of some given scalar “performance function.” Past work indicates that optimal motions tend to be periodic orbits with low period, but does not describe, beyond a brute force approach, how to determine which orbit is optimal in a particular scenario. For one-dimensional expanding maps and higher dimensional hyperbolic systems, we have found constructive methods for calculating the optimal average and corresponding periodic orbit and by carrying them out on a computer have found them to work quite well in practice. (Received February 14, 2006)